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Drawings by C. P. Meier

AIR AND SPACE TRAFFIC:

What's the Problem?

Traffic control beyond earth's atmosphere may seem like the least of the many problems we face as mankind begins venturing into outer space.

But a look at what's happened in the atmosphere between earth and space since 1903, when the Wright brothers had the air all to themselves, should convince us that outer space, too, will have its traffic hazards.

As for regulating flight traffic within the earth's atmosphere, news stories about collisions should be proof enough that our present airways traffic management system hardly seems geared to cope with what's to come.

Statistics on near misses, quite aside from collisions, indicate that under present conditions the air already is overcrowded.

What will the situation be by 1975, when it is estimated that ten times as many aircraft will be in operation?

For a variety of reasons, our methods of handling air traffic haven't kept pace with enormous advances during the past ten years made by our Air Force and our aviation industry. In this age of automation, our system of air traffic control still remains to a considerable extent in the primitive "control tower to pilot" conversational stage of guidance and direction. The system is virtually unchanged in its essentials from what was in operation in the '30's to take care of the far slower planes of that day. Existing and future technological advances for air traffic control, and the governmental set-up for managing national aviation affairs, will need to get more closely together if we're to use our vanishing air space with greater safety and efficiency.

The present chief cause of overcrowding is not just because there are more and more planes. Patterns of traffic concentration tend to follow population patterns. Thus congestion builds up over large metropolitan areas and on the routes connecting their air traffic hubs. In addition, adding to the hazards, military air bases tend to be located almost exclusively near communities with air line stops because of the need for civilian support for the military facility.

Who's to control space, and air traffic control, are all parts of a vital issue.

First let's consider air traffic control.

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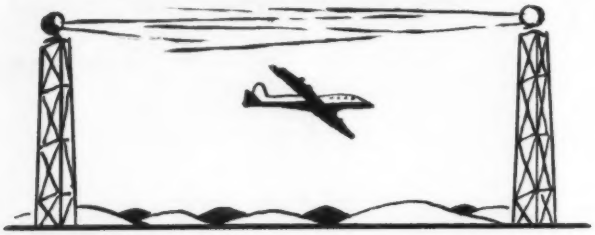
WHO'S IN CHARGE?

Congress has assigned to the Civil Aeronautics Administration the job of seeing that air traffic shall flow in safe and orderly fashion. The Federal airways system set up by the Civil Aeronautics Administration consists today of a network of visual and electronic aids to navigation marking over



158,000 miles of airways. There are also supporting air-ground and point-to-point communications systems. For approach to airports, and for landing, facilities include radar, approach lights, and air traffic control systems at large airports and on charted airways. A number of large airports also have instrument landing systems.

Flying is governed by two alternative sets of rules enforced by the Civil Aeronautics Administration. Under Visual Flight Rules, the pilot, to avoid collisions, relies solely on what he sees. This is normal flight procedure for most planes in good weather. Under Instrument Flight Rules, which go into effect automatically when visibility falls below certain minimums, air traffic control takes over the responsibility of assuring "positive separation" — longitudinal, lateral, and vertical — to each plane under its surveillance. Under IFR conditions, the pilot is assigned a specific altitude which he must maintain.

Instrument flight is possible and traffic control service available along all the nation's established airways, in areas around terminals, and in broad areas where intersecting routes create problems in air control. When IFR go into effect, this designated controlled airspace is specifically reserved for controlled flight.

But present air traffic control facilities haven't merely got more planes to cope with. They're also trying to provide

guidance for planes flying faster and faster. Beginning in 1959, civil jet airliners with cruising speeds of 600 miles per hour and better will join the thousands of military jets already using the airways. By 1975, it is figured that turbojet and turboprop planes will account for 90% of the domestic airline fleet. Supersonic carriers may arrive between 1970 and 1975. At the same time, and for most of the next two decades, large quantities of piston engine aircraft will operate along with the jets.

Higher speeds require a larger block of protective airspace around each plane. Faster closure rates call for faster action to eliminate collisions. The mixture of fast and slow aircraft produces special problems. And traffic is building up in areas where airspace is still uncontrolled.

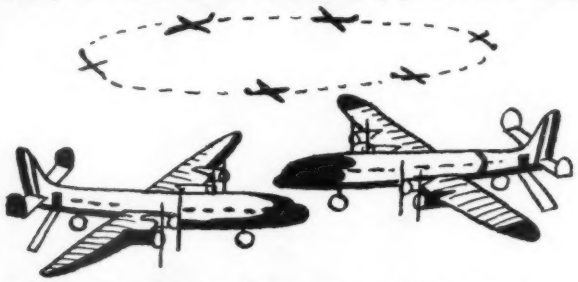
More than anything else, higher speeds are creating a need for traffic control in good weather as well as bad. Human eyesight is doubtful protection against collision at jet speeds. As of December 1, 1957, the Civil Aeronautics Administration initiated a program to control all airspace — but not all traffic — above 24,000 feet. This floor lowers to 15,000 feet in the spring of 1958.

One highly complicating factor faced by air traffic control is the difference in civil and military requirements. It's always been our national policy that there shall be a common system of navigation and traffic control for all users. But air traffic controllers have to cope with such military operations as getting interceptors up through traffic, large scale training missions, and the like.

HOW WE'RE DOING

To its credit, the present system of traffic control manages to insure a very high margin of safety. Between 1948 and 1956, there was a total of 140 mid-air collisions involving civil aircraft. Of these, only two were between air carriers in passenger service, and only 17 involved any carrier aircraft. But the Grand Canyon disaster on June 30, 1956, which took 128 lives, graphically illustrates the fearful potential for fatalities in mid-air collisions. As traffic and speed increase, so does the danger.

In order to maintain a high safety level under present methods of traffic control, restrictions on traffic movements are frequently imposed to the point where they defeat the very purpose of an airways system. They slow things up and cause exasperating delays. The control apparatus covering high density areas becomes saturated and many planes are daudling



and kept circling in the air, or never get off the ground.

To meet an increasingly critical situation, the Civil Aeronautics Administration, with the approval of Congress, launched a six-year modernization program in 1957 to meet the most urgent deficiencies of the present system. One of the key objectives of the Civil Aeronautics Administration plan is the integration of the civil and military electronic short-range navigation systems into a common network to serve both civil needs and military tactical requirements, providing track guidance and aircraft position information at all times. Resulting improved navigational accuracy should considerably increase air traffic capacity. Plans also call for a 75% increase in the number of instrument landing systems.

Another major aim of the Civil Aeronautics Administration program is the installation of a far larger amount of radar equipment to perform a variety of jobs, such as permitting closer spacing of aircraft or enabling a plane to make a landing under conditions of poor visibility.

Though an ambitious and expensive plan, the Civil Aeronautics Administration program does not go beyond 1962. By general agreement it is at best a stopgap and a "catching up" process.

WHAT NEXT?

The crucial question remains: what next?

As a help in considering it, we might take a look at recent history in an effort to find out why the nation's Federal airways system finds itself in such an antiquated condition. One explanation seems to be that there's a lack of clearly defined Federal responsibility for the management of our aviation affairs. And underlying this indecisiveness, there's the phenomenon of repeated conflict of interest between military and civil authorities.

In passing the Civil Aeronautics Act in 1938, Congress specified that "the Administrator shall give full consideration to the requirements of national defense." But in that pre-war era, military air operations were insignificant and uncomplicated. With the growth of the air services by the end of World War II, a Federal airways system capable of meeting military requirements, along with those of civil aviation, became of crucial importance. The need for a military voice in common system development was felt.

In 1946 came the first of several attempts to improve the situation. By executive order, the President set up the Air Coordinating Committee. This Committee was to facilitate communication between the nine government agencies with a major interest in aviation so that conflicts could be ironed out and joint decisions taken on mutual problems. The Committee succeeded in resolving thousands of controversies, but mostly on a local level, concerning such things as airspace use and navigation facilities. Because unanimous consent of the Committee members was required for action, many major policy problems, however, never got satisfactorily settled.

In 1956, President Eisenhower appointed Edward P. Curtis, an Air Force General in World War II, as Special Assistant for aviation facilities planning. His assignment was to conduct a long-range study of the nation's requirements and to draw up recommendations and a comprehensive plan.

Mr. Curtis and his group reached the conclusion that the chief reason for previous failure to modernize aviation traffic facilities lay not in any lack of scientific ideas or promising technical developments but in the inadequacy of "organizational arrangements . . . intended to set the goals, and to develop and to select the systems and methods which will meet these goals."

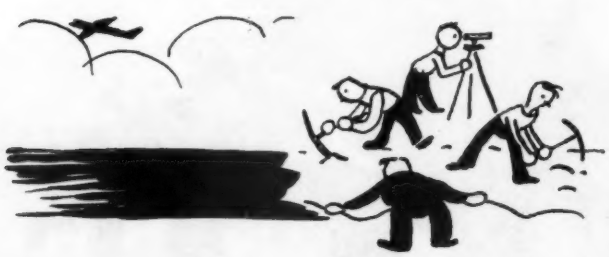
Legislation was drafted for the immediate creation of an Airways Modernization Board "to develop, modify, test, and evaluate systems, procedures, facilities, and devices, as well as to define the performance characteristics thereof, to meet the needs for safe and efficient navigation and traffic control of all civil and military aviation except for those needs of military agencies which are peculiar to air warfare and primarily of military concern, and select such systems, (etc.) . . . as will best serve such needs and will promote maximum coordination of air traffic control and air defense systems."

On August 14, 1957, the bill became law.

Let's keep alert for the Board's findings, and be prepared to exercise our citizenship through informed thinking, discussion, and decision.

GRASS ROOTS AIRPORTS

Though an integral part of the national aviation facilities system, airports are designed, financed, built, and operated by local authorities. Many will need lengthened and strengthened



runways to handle long-range jets. Equally important will be special fueling facilities, revamped loading areas, and greatly expanded passenger accommodations. It is estimated that airport capacity must be doubled by 1975.

Mr. Curtis, in his report, suggests that the Federal Government should conduct an airport research program as a guide to sound local planning.

What's our opinion as to that?

IS A NEW FEDERAL AVIATION AGENCY NEEDED?

The Curtis report also favors the creation of an independent Federal Aviation Agency. Within it, according to the Curtis plan, would be consolidated "all the essential management functions necessary to support the common needs of the military and civil aviation of the United States." These are now scattered here and there. As Mr. Curtis puts it, "The Government and the public should be able to look to one agency for the management and the responsibility for our national aviation affairs." If the plan goes through, the present Civil Aeronautics Administration would be absorbed within the new agency. Several other functions important to the national aviation facilities system, but now located in other organizations, would be transferred to the new Federal Aviation Agency.

The Curtis report feels that the creation of such an agency could be of particular importance in improving civil-military cooperation for the solution of mutual problems. Chief among these is competition for airspace. To quote Stuart G. Tipton, President of the Air Transport Association, "Airspace restrictions, largely imposed by real or fancied — and that is the issue — military requirements, are blocking off altitudes to the point where it is very difficult for civilian operators to move." As an editorial in *Aviation Week* puts it, what rankles is not the fulfilling of legitimate military requirements, which no one begrudges, but the attitude of the military that it has top priority over any and all airspace which it fancies.

What are our views as to the advisability of setting up a new Federal Aviation Agency, and what are our reasons for holding them?

AND NOW — SPACE!

The conquest of space is perhaps not yet far enough along for us to do much more than think about it. Yet as Senator Lyndon Johnson said, in proposing a Senate special committee to frame legislation concerning the development of outer space, such exploration "will dominate the affairs of mankind

just as the exploration of the Western Hemisphere dominated them in the 16th and 17th centuries."

When senatorial debate on such legislation begins — doubtless with measures for space traffic regulation included — we'll wish to follow it closely.

The immediate question facing our legislators is: Who's to handle America's space development program?

Should the Defense Department do it? We know that proficiency in space could be absolutely essential to national survival. Space ships armed with devastating, annihilating weapons and equipped with cameras, television, and electronic devices to keep tabs on other military activities could enable any one nation to control the world. It is imperative to have defenses against attack from space — and defense is the primary duty of our armed forces.

But ever since the founding of our Republic, we've had a fundamental belief in civilian control, and this belief is sure to play an important part in the ultimate decision as to who's to have charge of our program in space.

Should the Atomic Energy Commission be given the job? Present liquid and solid fuel for propelling rockets and space ships may soon seem as primitive as the sails that drove the ships of early navigators like Columbus, Americus Vespucius,

and Magellan on their pioneering explorations. Atomic power seems far more likely to have what it takes if we are to explore the trackless distances of space. Therefore, should the Atomic Energy Commission, already skilled in the potentialities of this titanic force, be put in charge of our development of space? Or should some brand new agency, perhaps along the lines of the Atomic Energy Commission, be set up instead?

Which alternative, if any, do we prefer, or what else would we suggest?

The Senate Special Committee that was voted into existence with only one Senator dissenting has set June 1, 1958, as the date on which to have legislation on space policy ready. In helping it to shape such legislation, it will seek to draw on the best available knowledge and advice. This will include the counsel of the National Science Foundation. It will include the findings of the Special Committee that has been set up by the Administration under the chairmanship of Dr. James Killian, President Eisenhower's scientific advisor. It will include testimony and suggestions brought out by closed and public hearings.

But meanwhile, there's a problem — a huge question mark — involved which we've been painfully aware of since the first beep of the original Russian Sputnik.

Is a struggle for sovereign control of space about to break out among the nations of the earth — a struggle which, if it resorts to force, would be suicidal to the human race? Or will peaceful development of the potentialities of these vastly expanded horizons bring the benefits of great achievements and advances to all mankind?

How high up does the present sovereignty of a nation go? The major indication as to that which we have right now seems to be the first article of the ICAO agreement which declares that each signatory nation has "complete and exclusive sovereignty over the airspace above its territory."

ICAO stands for International Civil Aviation Organization, which is an agency of the United Nations. It was started in 1944, when representatives of twenty-six nations met and agreed that, for the sake of greater safety and more efficient and beneficial use, there should be an international code of air traffic control. Each signing nation agreed to abide by certain rules of the sky. The International Civil Aviation Organization, as the supervisory body, was set up in 1947. Today some seventy nations belong — but they don't include the USSR or Red China.

The ICAO agreement, however, in its comment on sovereignty, doesn't define what is actually meant by "airspace." The generally accepted idea seems to be that "airspace" consists of the blanket or envelope of atmosphere which surrounds the earth to a height of fifty miles. Within this envelope there's enough density of air to allow for flight by winged aircraft. So the first article of the ICAO agreement would seem to imply that the bounds of each nation's sovereignty lie within this atmospheric envelope.

Beyond lies outer space — which, up till very recently, has received little attention from experts in international law, or from the officials of government who will make the decisions as to what's to be done about space.

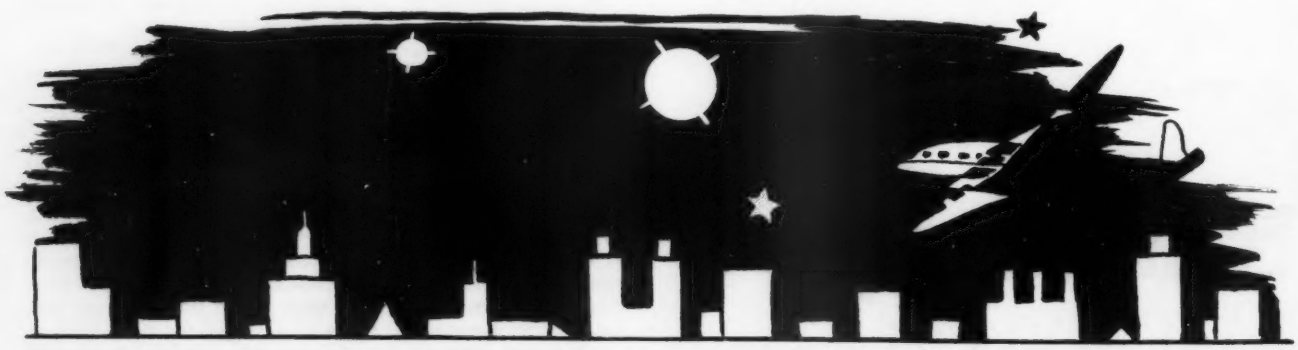
In this new age of space, John C. Cooper, legal consultant to the International Civil Aviation Organization, has suggested that the sovereignty of each nation should extend upwards 600 miles. But there's plenty of disagreement as to that. In 1956, before the launching of the first Sputnik, two Soviet lawyers, A. Kislov and S. Krylov, unofficially declared that "there's no limit to the height. The USSR has the right of the skies over their country to infinity." There are people in all nations, including the U.S.A., who also feel that way about space over their own particular country.

President Eisenhower, in a letter to Nikolai Bulganin, Chairman of the Council of Ministers of the Union of Soviet Socialist Republics, has made this suggestion: "I propose that we agree that outer space should be used only for peaceful purposes. We face a decisive moment in history in relation to this matter. Both the Soviet Union and the United States are now using outer space for the testing of missiles designed for military purposes. The time to stop is now." Chairman Bulganin's reply was noncommittal. Consideration of the matter, he indicated, should be part of the whole question of limitation of armaments.

Rocket development, as Secretary Dulles has remarked, is still in an elementary enough stage so as to be "readily subject to be controlled." But once a rocket armament race really gets going, control, as Secretary Dulles points out, becomes increasingly "impossible."

Sir Leslie Munro, of New Zealand, President of the UN General Assembly, has indicated that the next General Assembly meetings will devote much time to the question of international control of outer space. Dr. Oscar Schachter, legal director of the UN, has also warned, "the time to act is now. Questions about space rights are not far-fetched — they're immediate and practical."

What are our views and what are our reasons for holding them, as to whether the right to space should be exercised by each nation individually or should go under some form of international control?



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